

the boundaries (x_g, y_g) in horizontal direction for removal in a subsequent layer (S_{i+1}) are determined in accordance with the depth (z) of the hollow from the form definition of the hollow.

28. (NEW) Method according to claim 27, characterized in that the thickness (Δz) of a removed layer (S_i) is determined from measured depths of the hollow, and the boundaries (x_g, y_g) in horizontal direction for removal in a subsequent layer (S_{i+1}) is determined also in accordance with the determined layer thickness (Δz) from the form definition of the hollow.

29. (NEW) Method according to claim 27, wherein the boundaries of removal in a layer are determined with reference to stored form data of the hollow.

30. (NEW) Method for forming a specifically formed hollow in a work piece by means of a laser machining apparatus which removes, in a layer-wise manner, material of the work piece in accordance with the defined shape, the depth of the hollow being continuously measured,

characterized in that the measured values are continuously stored together with the respective coordinates or at memory locations corresponding to the respective coordinates and are later on used for driving the laser machining apparatus.

31. (NEW) Method according to claim 30, characterized in that a stored measured value is used when, within the same layer, the laser is near a site corresponding to the measured value and/or when, in a subsequent layer, the laser is at or close by a site corresponding to the measured value.

32. (NEW) Method according to claim 30, characterized in that a measurement value is used for adjusting the instantaneous or future interaction parameters of a laser beam.

33. (NEW) Method according to claim 32, characterized in that for a pulsed laser the laser amplitude and/or the impulse elevation and/or the duty ratio are adjusted.

34. (NEW) Method according to claim 30, characterized in that the stored measured values are used for removing a partial layer.

35. (NEW) Method according to claim 30, in which for measuring the depth with a depth sensor a light emanating from a working site is used,
characterized in that the depth sensor is calibrated,
a depth is measured at a specific site of the hollow,
the measured value is corrected in accordance with the position of the site and with reference to the correction values stored during calibration, and
the corrected value is used as measured depth.

36. (NEW) Method according to claim 35, characterized in that correction is made by adding a value or by multiplying a value.

37. (NEW) Method according to claim 35, characterized in that a correction is made in accordance with the depth of the hollow.

38. (NEW) Method according to one of the claims 35, wherein for calibrating the depth sensor the depth of measurement points on a calibrating surface with known shape are measured,

the measured values are compared with known values at the respective measurement point of the calibrating surface, and

correction values are stored in accordance with a difference between the measured value and the known value together with the respective coordinates or at memory locations corresponding to the respective coordinates.

39. (NEW) Method according to claim 38, characterized in that for depth measurement the sensor uses a light emanating from the working site, and that laser light is guided through a laser beam guidance across the surface of the work piece within a working area defined by the apparatus.

40. (NEW) Method according to claim 38, characterized in that the calibrating surface is a plane.

41. (NEW) Method according to claim 40, characterized in that the calibrating surface is measured a plurality of times, and the calibrating surface is shifted as compared to the measurement system in horizontal direction between various measurements, wherein for measurement points corresponding to each other within the working area or being close to each other correction values are formed in accordance with all measurements for said measurement point and are stored for said measurement point.

42. (NEW) Method according to one of the claims 38, characterized in that the distance between measurement points in advancing direction of the laser beam is determined by the processing speed of a digital system and by the advancing speed of the laser beam.

43. (NEW) Method according to claim 40, characterized in that the calibrating surface has an unevenness smaller than 5 micrometers, preferably smaller than one micrometer.

44. (NEW) Apparatus for making a specific shaped hollow (10) in a work piece (11), comprising

a laser machining apparatus (12-18) which, in a layer-wise manner, removes material of a work piece (11) in horizontal layers (S; xy) corresponding to the specific shape, and

a measurement apparatus (70-73) which continuously measures the depth (z) of the hollow,

characterized by a control apparatus (81) which determines the boundaries (x_g , y_g) in horizontal direction for removal in a subsequent layer (S_{i+1}) in accordance with the depth (z) of the hollow from the form definition.

45. (NEW) Apparatus according to claim 44, characterized in that the control apparatus comprises a determining means (82) for determining the thickness (Δz) of a removed layer (S_i) from the measured depth of the hollow, and the control apparatus (81) determines the boundaries (x_g , y_g) in horizontal direction for removal in a subsequent layer (S_{i+1}) also in accordance with the determined layer thickness (Δz).

46. (NEW) Apparatus according to claim 44, characterized by a memory (83) for storing the form definition of the hollow (10).

47. (NEW) Apparatus for making a specifically shaped hollow (10) in a work piece (11), comprising

a laser machining apparatus (12-18), which, in a layer-wise manner removes material from the work piece (11) corresponding to the specific shape, and a measurement apparatus which continuously measures the depth (z) of the hollow,

characterized by a memory means (91) which continuously stores the measurement values together with the respective coordinates or at memory locations corresponding to the respective coordinates, and

a control apparatus (63, 92, 93) which controls the laser machining apparatus (12-18) in accordance with the stored measurement values.

48. (NEW) Apparatus according to claim 47, characterized in that the control apparatus uses a stored measurement value if within the same layer the laser beam is close by a site corresponding to said measurement value, and/or if, in a deeper layer, the laser is close by or at a site corresponding to the measurement value.

49. (NEW) Apparatus according to claim 47, characterized in that the control apparatus uses a measurement value for the instantaneous or later adjustment of the interaction parameters of the laser beam.

50. (NEW) Apparatus according to claim 44, the laser machining apparatus (12-18) guiding, by means of a laser beam guidance, the laser light across the surface of a work piece within a working area defined by the apparatus, comprising

a depth sensor (70, 71) which uses for depth measurement light emanating from the working site and generates a measurement value,

characterized by a calibrating apparatus (72-74) adapted to measure a preferably flat calibrating surface and having a memory (73) for storing correction values in accordance with differences between measurement values and known

values together with the respective coordinates or at memory locations corresponding to the respective coordinates, and

a correction apparatus (74, 75) which corrects the measurement value in accordance with the position of the site with reference to the correction values stored in said memory (74).

51. (NEW) Apparatus according to claim 50, characterized in that the correction is made by adding a value and/or by multiplying a value.

52. (NEW) Apparatus according to claim 50, characterized in that a correction is made in accordance with the depth of the hollow.

REMARKS

Applicants have canceled claims 1-26 without prejudice or disclaimer.

Please add new claims 27-52.